PERFORMANCE OF PROGENY SIRED BY SUPERIOR AND INFERIOR INDEXING CENTRAL TEST STATION HAMPSHIRE AND DUROC BOARS

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Story In Brief

Hampshire and Duroc boars were purchased from central test stations in pairs with each pair including a high indexing and a low indexing boar. Boars were evaluated for an index which combined average daily gain, feed efficiency and probe backfat thickness. Offspring of high indexing Hampshire boars were 5 units better for the index and were slightly superior, on the average, for average daily gain and backfat thickness. Gilts sired by high indexing Duroc boars grew faster, were fatter and were 4 points better for the index than gilts by low indexing Duroc boars, while barrows by high indexing Duroc boars were slower growing, leaner and not significantly different for the index than barrows sired by low indexing Duroc boars. These results indicate that high indexing central test station boars can be a supplement to, but should not replace, a good on-farm testing program.

(Key Words: Swine, Test Station, Growth, Efficiency, Backfat)

Introduction

Central test stations serve a two-fold purpose as a demonstration of uniform performance testing methods and as a possible source of replacement boars for both seedstock and commercial herds. The index for which tested boars are evaluated was constructed from results of experiments where animals were maintained in one environment. Little evidence exists on how well expectations of performance based on experimental results relate to the performance of progeny sired by central test station boars with varying pre-test management. This study was conducted to compare progeny of high and low indexing central test station boars under near commercial production conditions.

Materials and Methods

A two year study was conducted comparing progeny of high and low indexing Hampshire and Duroc central test station boars purchased in Iowa, Missouri, Nebraska and Oklahoma. Boars were evaluated for an index, recommended by the National Swine Improvement Federation for test stations (Hubbard, 1981). The index is $I=100 + 60(G-\bar{G})-75(F-\bar{F})-70(B-\bar{B})$ where G is average daily gain, F is feed efficiency (lbs feed/lb gain) and B is average backfat thickness. Symbols with bars over them represent contemporary central test station means. Boars were purchased in pairs with one having an index greater than 118 and the other having an index value less than 90. The index has a mean of 100 and 75% of the boars will have index values between 125 and 75. Boars with an index value of less than 80 are usually excluded from the sale.

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The first year 12 high indexing and 12 low indexing Hampshire boars were purchased and were mated to three- and four-breed cross gilts while the second year 13 high indexing and 12 low indexing Duroc boars were purchased and mated to gilts produced the previous year. The performance of the purchased boars is summarized in Table 1.

Approximately 99 females were farrowed during each of two farrowing seasons per year. Gilts were farrowed in a central farrowing barn and litters were weaned at 42 days of age. Performance test began at approximately 56 days of age with pigs penned in groups of 12 to 18. Pigs were fed a 16% crude protein ration until average pig weight in the pen was 120 pounds when the ration was changed to 14% crude protein. Pigs were weighed weekly and were removed from the pen as they reached 220 pounds. Fat thickness was measured by ultrasound at the shoulder, last rib and last lumber vertebra at the end of test. Feed efficiency (lbs feed/lb gain) was measured on a pen basis. A barrow was randomly selected from each litter for carcass evaluation. The first year 132 barrows were slaughtered while the second year 136 were slaughtered. There were 730 pigs that completed test and had an index calculated the first year, while 1032 pigs met the same criteria the second year. Data were analyzed so that the effects of sex, farrowing season and breed of dam were accounted for when making comparisons among progeny sired by high and low indexing boars.

Table 1. Average performance of boars purchased from test stations[a].

Season[a]	Average Daily Gain (lbs)	Feed Efficiency (lbs.feed/lb.gain)	Probe Backfat thickness(in)	Index
		High Indexing Boars		
Fall 1979[b]	2.27	2.34	.73	131
Spring 1980	2.18	2.55	.69	128
Fall 1980	2.27	2.25	.77	137
Spring 1981[b]	2.38	2.52	.71	129
		Low Indexing Boars		
Fall 1979	1.81	2.62	.74	83
Spring 1980	1.87	2.84	.71	87
Fall 1980	1.92	2.59	.87	83
Spring 1981	1.96	2.68	.85	83

[a]Hampshire boars were purchased the first two seasons while Duroc boars were purchased the last two.

[b]Two boars did not leave offspring.

Results and Discussion

The performance of barrows and gilts sired by high and low indexing boars is given in Tables 2-6. Only small differences were found between progeny sired by high and low indexing Hampshire boars for average daily gain and probe backfat thickness (Table 2). Pigs sired by high indexing Hampshire boars were more feed efficient in the fall born litters, while the reverse was true for the spring born litters (Table 3). Progeny

Table 2. Post-weaning performance of progeny sired by high and low indexing central test station Hampshire boars.

	No.	Sire Group High Index	Low Index
Average Daily Gain (lb/day)	868	1.43[a]	1.41[a]
Probe Backfat Thickness (in)	826	.91[a]	.92[a]
Index	730	103[a]	98[b]

[ab]Means in rows that have different superscripts differ significantly.

Table 3. Feed consumption and efficiency of progeny sired by high and low indexing central test station Hampshire boars.

	Season of birth	No. of pens	Sire Group High Index	Low Index
Feed Efficiency (lb feed/lb gain)	spring	24	3.06[a]	2.82[b]
Average Daily Feed Consumed (lb/day)	spring	24	3.97[a]	3.35[b]
Feed Efficiency (lbs.feed/lbs.gain)	fall	42	3.06	3.15
Average Daily Feed Consumed (lb)	fall	42	3.95	4.17

[ab]Means in rows with different superscripts differ significantly.

sired by high indexing Hampshire boars did have a larger index value than did pigs sired by low indexing Hampshire boars indicating that the small average advantages for the component traits did accumulate when all traits were combined in the index. Mean growth rate and backfat thickness values of pigs sired by Duroc boars were different for barrows and gilts so the results are presented separately by sex. Gilts sired by high indexing Duroc boars were faster growing, fatter and had a higher average index score than those gilts sired by low indexing Duroc boars (Table 4). Barrows, on the other hand, sired by high indexing Duroc boars grew slower, were leaner and were not different for the evaluation index compared to barrows of low indexing Duroc boars. Progeny sired by high indexing Duroc boars and out of gilts sired by high indexing Hampshire boars were more efficient and ate less feed when compared to progeny sired by low indexing Duroc boars that were out of gilts sired by high indexing Hampshire boars (Table 5). The converse was true of

Table 4. Post-weaning performance of gilt and barrow progeny sired by high and low indexing central test station Duroc boars.

	Sex	No.	Sire Group High Index	Sire Group Low Index
Average Daily Gain (lb/day)	gilt	629	1.52[a]	1.46[b]
Probe Backfat thickness(in)	gilt	622	.87[a]	.83[b]
Index	gilt	600	102[a]	98[b]
Average Daily Gain (lb/day)	barrow	452	1.59[a]	1.61[b]
Probe Backfat Thickness (in)	barrow	448	.90[a]	.93[b]
Index	barrow	432	102[a]	102[a]

[ab]Means in rows that have different superscripts differ significantly.

Table 5. Feed consumption and efficiency of progeny sired by high and low indexing central test station Duroc boars.

	Maternal grandsire	No. of pens	Sire Group High Index	Sire Group Low Index
Feed Efficiency (lbs.feed/lb.gain)	high index	39	2.61[a]	2.96[b]
Average Daily Feed Consumed (lbs)	high index	39	4.06[a]	4.59[b]
Feed Efficiency (lbs feed/lb gain)	low index	42	3.06[a]	2.73[b]
Average Daily Feed Consumed (lbs)	low index	42	4.76[a]	4.08[b]

[ab]Means in rows with different superscripts differ significantly.

Table 6. Carcass backfat thickness and percent muscle of barrows sired by high and low indexing central test station boars.

	No.	Sire Group High Index	Sire Group Low Index
Hampshire sired barrows	132		
Backfat thickness (in)		1.05	1.05
Percent Muscle (%)		53.64	53.73
Duroc sired barrows	136		
Backfat thickness (in)		1.05[a]	1.11[b]
Percent Muscle (%)		54.77[a]	54.21[b]

[ab]Means in rows with different superscripts differ significantly.

progeny out of gilts sired by low indexing Hampshire boars with those progeny sired by low indexing Duroc boars being more feed efficient and eating less than progeny sired by high indexing Duroc boars. Barrows sired by high vs low indexing Hampshires were no different compared to each other for carcass backfat thickness and percent muscle; however, high indexing Duroc sired barrows were leaner and had more muscle when compared to barrows sired by low indexing Duroc boars (Table 6).

The expected heritability for the evaluation index, based on average literature estimates of heritabilities of the traits and genetic correlations among the traits is .37. The realized or actual heritability of the index computed from the high vs. low comparison was .16. This loss in selection efficiency can be partially explained by the boars having differing pre-test management and the offspring of the boars being raised in a different environment and under different management conditions than that of their sires.

Progeny sired by high indexing boars were superior for the evaluation index when compared to progeny of sires that were inferior for the index although the differences were not large. Commercial producers purchasing high indexing test station boars can expect subsequent offspring to be above average for the index and over time to show favorable response for its component traits. It is, however, probably important to use the performance of the boars in the test station in conjunction with an awareness of the on-farm testing program conducted with the owner. The purchase of superior indexing central test station boars should complement a good within herd performance testing program.

Literature Cited

Hubbard, D. 1981. Guidelines for Uniform Swine Improvement Programs. USDA Program Aid 1157.